**CHEM 114: General Chemistry II**

**Department:** Chemistry

**Designation:** Required

**Catalog Data:** 3-0) 3 credits. Prerequisite: CHEM 112 and MATH 102. A continuation of CHEM 112. An introduction to the basic principles of chemistry for students needing an extensive background in chemistry.

**Prerequisites:** CHEM 112 and MATH 102.

**Textbook:** Brady, Senese; “Chemistry: Matter and Its Changes”, Fifth edition, Wiley text with enrollment in WileyPLUS with CATALYST

**Course Learning Outcomes:**

 Students will obtain a foundation in the fundamental principles and models of chemistry necessary for an understanding of the composition, structure, and properties of matter and the changes that matter undergoes.

* Understand rates of reaction and conditions affecting rates.
* Derive the rate equation, rate constant, and reaction order from experimental data.
* Use integrated rate laws.
* Understand the collision theory of reaction rates and the role of activation energy.
* Understand the nature and characteristics of chemical equilibria.
* Understand the significance of the equilibrium constant, K.
* Understand how to use the equilibrium constant in quantitative studies of chemical equilibria.
* Understand and use Le Châtelier’s Principle in predicting the effects of stresses on equilibrium systems.
* Use the Brønsted-Lowry and Lewis concepts of acids and bases.
* Apply the principles of chemical equilibrium to acids and bases in aqueous solution.
* Understand the control of pH in aqueous solutions with buffers.
* Evaluate the pH in the course of acid-base titrations.
* Apply chemical equilibrium concepts to the solubility of ionic compounds.
* Understand the concept of entropy and how it relates to spontaneity.
* Use tables of data in thermodynamic calculations.
* Define and use free energy in predicting the spontaneity of chemical processes.
* Balance net ionic equations for oxidation-reduction reactions.
* Understand the principles of voltaic and electrolytic cells

**Topics:** An introduction to the basic principles of chemistry for students needing an extensive background in chemistry

**Class/Laboratory Schedule:** MWF 9:00-10:30 PM

**Contribution to Criterion 5:** 3 credits of basic sciences

**Relationship of Course to ABET Outcomes (a) through (k)**

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|  | **Level of Emphasis** |
|  | Low | Medium | High |
| **ABET Outcome** |  |  | X |
| (a) an ability to apply knowledge of mathematics, science, and engineering |  |  |  |
| (b) an ability to design and conduct experiments, as well as to analyze and interpret data |  | X |  |
| (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability |  |  |  |
| (d) an ability to function on multidisciplinary teams |  |  |  |
| (e) an ability to identify, formulate, and solve engineering problems |  |  |  |
| (g) an ability to communicate effectively |  |  |  |
| (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context |  |  |  |
| (i) a recognition of the need for, and an ability to engage in life-long learning |  |  |  |
| (j) a knowledge of contemporary issues |  |  |  |
| (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. |  | X |  |

**Prepared By:** Dr. Duane Hrncir, Ph.D. Chemistry and Provost and Vice President for Academic Affairs, June 1, 2010